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THE THAMES RUN DRY.

WHEN we look from London Bridge at the Thames, even at the very lowest tide, it is extremely hard to believe that less than two hundred years have passed since men walked across its bed, not indeed dry shod, but without serious inconvenience. We are not prepared to defend all that old chroniclers say, but on the other hand we are not inclined to regard all the following narratives as fictitious. Why should we?

The old London Bridges were almost like weirs, so greatly did they obstruct the flow of the river; but making full allowance both for that, and for slightly figurative language, the statements are very marvellous.

For suggesting the subject and for collecting some of the information, we are indebted to Mr. Henry Sharp, of Hampstead. We have added to it as much as time permitted, and if any of our readers can supplement or contradict it, we shall be obliged by their so doing, as of course our only desire is to ascertain facts.

A.D. 1114.—“This year there was so great an ebb everywhere in one day as no man remembered before, so that men went through the Thames, both riding and walking, east of [*i.e.* below] London Bridge.—*Anglo Saxon Chronicle*, Bohn's Edition, 1847, p. 484.

A.D. 1114.—April 4th. River Thames in London so dry that children waded over between the bridges, and the town. Under London Bridge only knee deep; was dry for two days.—*Stow*.

A.D. 1114.—October 10th. The Thames on that day suffered a great want of water; for between the bridge [*i.e.* London Bridge] and the royal Tower, and even under the bridge, the water of the river was so diminished, that not only horses, but also an innumerable crowd of men and boys walked through it, the water hardly reaching their knees. This shortness of water lasted from the middle of the preceding night till the full darkness of the following night.—*Florence of Worcester*.

- A.D. 1114.—Such a defect of water in the Thames that great numbers of people crossed not only above and below London Bridge, but likewise through several of its arches, upon the ground, with dry feet.—*Maitland's History of London.*
- A.D. 1158.—An earthquake happened in many places through England, and the River of Thames was dried uppe, that at London men might walke over the same dryshod.—*Stow's Annals*, 1615.
- A.D. 1281.—So great a drought that men passed over the river Thames dryshod between Westminster and Lambeth, and over the Medway between Strood and Rochester.—*Stow.*
- A.D. 1541.—A remarkable drought; almost all the small rivers dried up, and the river Trent diminished to a straggling brook. The river Thames so low that the sea water even at ebb, extended beyond London Bridge.—*E. J. Lowe's Natural Phenomena & Chronology of the Seasons*, 1870, p. 18.
- A.D. 1591.—The Thames, historians say, was so dried up, that a man might ride over it on horseback near London Bridge, —*Thoresby.*
- A.D. 1592.—September 5th. One standing on the shore of the Thames could not see any water in it from London Bridge to Westminster.—*Stow* [See quotation in full under date of 1716, Sept. 14th.]
- A.D. 1687.—May 12. This day there was such a storm of wind as had seldom happened, being a sort of hurricane. It kept the flood out of the Thames so that people went on foot over several places above bridge.—*Evelyn in Baker's Seasons.*
- A.D. 1716.—September 14th. This being the last occasion, we have taken some pains to collect corroborative evidence as well as direct statements, and have quoted repetitions where any fresh fact is mentioned.
- A.D. 1716.—DEAL.—September 14th. "Last night we had a violent storm at S.W., which drove several ships from their anchors."—*The Post Man*, No. 11520, September 15th to 18th, 1716.
- DOVER.—September 14th. "Last night, in a dreadful storm, a Dutch ship was cast away."—*Idem.*
- HARWICH.—"On Thursday night, September 13th, two laden ships from Newcastle were lost."—*Idem.*
- YARMOUTH.—"Last night we had a violent storm, which drove from their anchors several vessels."—*Idem.*
- LONDON.—"So violently tempestuous was this storm, that it obstructed the coming up of the tide in the River of Thames, which was even driven to so low an ebb, that both above and below the Bridge, people passed and re-passed on the sands, which lay so clearly bare to view, that a silver tankard, a silver-hilted sword, a gold ring, a

guinea, and several other things, were taken up, that had been lost there."—*The Weekly Packet*, No. 220, September 15th to September 22nd, 1716.

- A.D. 1716.—September 14th. And in speaking of this, it ought to be taken notice that this river has several times been blown almost dry, so that one on the shore could not see any water in it from London Bridge to Westminster, particularly on the 5th of September, 1592, and again on the 14th of September, 1716; of the last I was an eye witness. The springs being then low, a strong Westerly wind that had blown all that day and the preceding night, prevented the tide coming in twenty-four hours, and drove forward the fresh water with that fury that there was only a narrow channel in the middle scarce ten yards wide, and so shallow that thousands of people passed over it on foot.—*Survey of London and Westminster*, by J. Stow, edited by J. Strype, 1754, Vol. 1, p. 58.
- A.D. 1716.—[Date not given, context shows that it refers to 1716, 1717 or 1718, and therefore it doubtless was September 14th, 1716, *i.e.*, the same as the preceding.] By a long and dry season, the fresh stream of the river Thames was reduced so low, that by the intervention of a violent storm of wind at West South West, it was blown so dry, that many thousands of people passed it on foot, both above and below London Bridge, and through most of the arches.—*History of London*, by W. Maitland, F.R.S., 1775, p. 521.
- A.D. 1716.—September 14th. The Thames lay perfectly dry both above and below bridge, leaving only a very narrow channel; which extraordinary circumstance was occasioned by a strong westerly wind, that blew all the preceding day and night, which forced back the tide, and drove forward the ebbing waters.—*Boyle's Universal Chronology*, 1826, vol. ii., p. 748.
- A.D. 1716.—“In the year 1716 a very remarkable phenomenon occurred at London Bridge, when in consequence of the long drought, the stream of the River Thames was reduced so low, and from the effect of a violent gale of wind at W.S.W. was blown so dry, that many thousands of people passed it on foot, both above and below the bridge, and through most of the arches. Strype, in his edition of Stow's *Survey*, Vol. 1, p. 58, states that he was an eye-witness to this event, and observes that, on September 14th, the channel in the middle of the river was scarcely ten yards wide, and very shallow, the violence of the wind having prevented the tide from coming up for the space of four and twenty hours. Whilst the Thames remained in this state, many interesting observations were made on the construction and foundation of London Bridge.”—*Chronicles of London Bridge*, p. 482-3, by an Antiquary, London, 1827.

THE FIRST USE OF KITES IN METEOROLOGY.

To the Editor of the Meteorological Magazine.

SIR,—In your review of the scientific use of kites at the Blue Hill Observatory (*Met. Mag.*, February, 1895, p. 10), you say:—“We believe that the first use of a kite in connection with meteorology was about 1750, when Franklin, in his well-known experiment, obtained electrical discharges from a thunder-cloud by means of a cord carried up to the cloud by a kite.”

As the successful exploration of the lower mile of air by self-recording instruments, elevated by kites, at this Observatory is attracting world-wide attention, it seems but fair to state that kites were not first used for this purpose in 1752 by my illustrious countryman, Dr. Franklin, but, as far as I know, the credit belongs to a Scotchman, Dr. Alexander Wilson, Professor of Practical Astronomy at Glasgow, who in 1749, with a student, Thomas Melville, explored the temperature of the atmosphere in the higher regions by raising a number of paper kites one above another upon the same line, with thermometers appended to those that were to be most elevated. I quote an account of the experiment tried at Camlachie in July, 1749, from the biography of Alexander Wilson, M.D., contained in *Trans. Roy. Soc. Edin.*, Vol. x., Part II. :—

“Six paper kites, 4 to 7 feet in height, were made upon the strongest and lightest construction the materials would admit of. A quantity of line was spun of different sizes and strength. . . . The smallest kite, being exactly balanced, soon mounted steadily to its utmost limit, carrying up a line very slender, but of a strength sufficient to command it. In the meantime the second was made ready. Two assistants supported it between them in a sloping direction, with its breast to the wind, and with its tail laid out evenly on the ground behind, whilst a third person, holding part of its line tight in his hand, stood at a good distance directly in front. Things being so ordered, the extremity of the line belonging to the kite already in the air was hooked to the back of the second, which being now let go, mounted very superbly, and in a little time also took up as much line as could be supported to advantage, thereby allowing its companion to soar to an elevation proportionately higher. Upon launching these kites according to the method which had been projected, and affording them abundance of proper line, the uppermost one ascended to an amazing height, disappearing at times among the white summer clouds, whilst all the rest in a series, formed with it in the air below such a lofty scale, and that, too, affected by such regular and conspiring motions as at once changed a boyish pastime into a spectacle which interested every beholder. The pressure of the breeze upon so many surfaces communicating with one another, was found too powerful for a single person to withstand when contending with the undermost strong line, and it became necessary, therefore, to keep the mastery over the kites by other means.

"This species of aerial machinery answering so well, Messrs. Melville and Wilson employed it several times during that and the following summer in pursuing those atmospherical experiments for which the kites had been originally intended. To obtain the information they wanted, they contrived that thermometers properly secured, and having bushy tassels of paper tied to them, should be let fall at stated periods from some of the higher kites, which was accomplished by the gradual singeing of a match-line. When engaged in these experiments, though now and then they communicated immediately with the clouds, yet as this happened always in fine dry weather, no symptoms whatever of an electrical nature came under their observation. The sublime analysis of the thunderbolt and of the electricity of the atmosphere, lay yet entirely undiscovered, and was reserved two years longer for the sagacity of the celebrated Dr. Franklin."

A. LAWRENCE ROTCH, F.R.Met.Soc.,

Director Blue Hill Met. Observatory.

Readville, Mass., U.S.A., July 4, 1896.

REVIEWS.

*Neudrucke von schriften und Karten * * * herausg.* von Prof. Dr. HELLMANN. No. 5. *Die Bauern-Praktik*, 1508. Berlin: A. Asher and Co., 1896. 4to, 83 pages.

It is unnecessary for us to say anything as to the excellence of this series of reprints. If in times to come meteorologists take any interest in the early history of their science, there will be no one to whom they will be so much indebted as to Dr. Hellmann. Who wrote this manual of weather proverbs is not known, but we believe that Dr. Hellmann is right in describing it as having the largest circulation of any meteorological book; sixty editions of it appeared in Germany, and it was translated and reprinted in France, England, Denmark, Norway, Sweden, Bohemia, Finland, &c. MS. copies have been traced back to the 10th century.

We are not going over the ground covered by Dr. Hellmann, but he has pointed out the difficulty of tracing in Germany the history of English editions of a popular book of this kind. He has done wonderfully well, but the hunt had a charm for us, and so, instead of reviewing Dr. Hellmann's book, we have done what we could towards giving a list of English editions. We are aware of many imperfections in it, but work of this class can be done by us only as a rest from matters of more practical importance, and our list must be accepted *quant. val.* Moreover, popular books like this, printed on poor paper, seldom provided with any better binding than a thick paper cover, were rarely preserved. As an illustration of the numbers which have perished, we may point out that the edition of

1806 ? is stated on the second title page to be the 12th edition, and we cannot trace a single copy of any one of the previous eleven.

As might have been expected, both from the date, and from the class of printers by whom the books were issued, the printing and the spelling are very bad. We have endeavoured to reproduce the titles verbatim, and have not specially marked the misprints; they are obvious.

THE BOOK OF KNOWLEDGE—THE HUSBANDMAN'S PRACTICE—
THE SHEPHERD'S PROGNOSTICATION.

Before giving the list of editions, it may be well to explain that in its complete form the book consists of three parts, as above.

The first is attributed to Godfridus, an astronomer, of whom we can find no trace.*

The second is said to be based upon the works of Albert (*i.e.*, Albertus Magnus, 1193–1280), Alkind (*i.e.*, Alkindus, author of a treatise on rain, 1100?), Haly (*i.e.*, Albuassin or Alboazen Haly, an Arab Astrologer, 1255?), and Ptolomy (*i.e.*, Ptolemy the Astronomer, 120–161).

The third book is attributed to “Melampus, a Greek Author,” of whom the only traces we have found are that Houzeau and Lancaster, in their *Bibliographie d'Astronomie* report, a MS. by Melampus = Melampous, entitled, “Methodus praedictionum lunarium,” as existing in the Imperial Library at Vienna, and that Watt says that there was a Melampus or Melampodius, a physician, B.C. 270, but we are not aware of his having left any work on the weather, and certainly he in B.C. 270 could not have utilized the labours of Albertus Magnus and others who were not born until hundreds of years after he was buried.

1530 ? GODFRIDUS. Here begynneth THE BOKE OF KNOWLEDGE OF THYNGES VNKNOWNEN APPERTYNYNGE TO ASTRONOMYE, with certayne necessarye Rules, and certayne Sp[h]eres conteynyng herein. * * *

Compyled by GODFRIDUS *super Palladum de Agricultura Anglicatum.*

16mo—woodcut on back of title.

Impr. by me, Robert Wyer, dwellynge at the Sygne of S. John Euangelyst in S. Martyns Paryshe besyde Charynge Crosse.

British Museum Library.

(Lowndes reports two editions, one with cuts, the other without, but he gives no dates.)

* We think it just possible that the name Godfridus was placed upon the title page to give importance to the book. We see no reference to Godfridus in the lists for other countries, and have a suspicion that Godfridus was one Thomas Godfrey, a London printer, whose books are mostly without date, but a few are dated 1522 and 1532.

- [?] THE BOKE OF KNOWLEDGE OF THYNGES VNKNOWN, APPERTEYNING TO ASTRONOMYE, with certaine necessarye Rules. 16mo. London, Hugh Jackson. Watt.
- [?] THE HUSBANDMAN'S PRACTISE; or, PROGNOSTICATIONS FOR EVER, as teacheth Alberte, Alkin, Haly and Ptholome. 16mo. London, Hugh Jackson. Watt.
1585. THE KNOWLEDGE OF THINGES VNKNOWNE, APPERTYNYNG TO ASTRONOMY, wyth necessary Rules and certayne Sp[h]eares containyd in the same. Complyed by Godfridus *super palladium de agricultura Anglicatum*.
Imprinted at London, in Fleetestreete, beneath the Conduite, at the Signe of S. John Euangelist, by H. Jackson, 1585. 8vo.
British Museum Library.
1588. THE BOKE OF KNOWLEDGE. 8vo. London, Hugh Jackson. Watt.
1642. The Husbandman's Practice.
Printed at London by A. N. for Iohn Stafford and are to be sold at his house in Black Horse [Alley in Fleet St.] Sm. 8vo. Hazlitt.
1649. The Knowledge of Things Unknown, with the Shep-berd's Perpetual Prognostication.
London: Printed by T. B. for John Stafford. 8vo. Hazlitt.
1660. The Husbandman's Practice.
Printed for John Stafford and are to be sold at the sign of the George at Fleet Bridge. 8vo. Hazlitt.
1663. The Knowledge of things Unknowne. shewing the Effects of the Planets and Astronomical Constellations, with the strange events that befall Men borne under them, front., woodcut on title, and several others. Black Letter. 8°. "Compiled by GODFRIDUS *super palladium de Agricultura, Anglicarum*:" this edition includes also the popular books—"The Husbandman's Practice, or Prognostication for ever," "The Shepheard's Prognostication and Wheel of Fortune."
Symons's Catalogue.
1664. THE HUSBANDMAN'S PRACTICE. 12mo. Hazlitt.
1668. Title page missing, but [The Knowledge of Things, &c.] 8vo. Printed by G. P. for George Sawbridge, on Clearkenwell Green. Hellmann's Library.

1671. **Godfridus. The Knowledge of things Unknown, with the Husbandman's Practice or Prognostication for ever.**
12mo. Printed by G. P. for G. Sawbridge, on Ludgate Hill near Fleet-bridge.
Symons's Catalogue.
1673. **The Knowledge of things Unknowne, &c., as in 1663.**
Two plates, 8vo.
Printed by W. T.[hackeray], and are to be sold by J. Hose over against Stapels Inn in Holborn.
British Museum Library.
1676. **THE KNOWLEDGE OF THINGS UNKNOWN, shewing the Effects of the Planets, &c.**
12mo. Printed for W. G. and are to be sold by J. Hose, over against Stapels Inn, in Holborn.
British Museum Library.
1679. **THE KNOWLEDGE OF THINGS UNKNOWN, &c.**
Lowndes.
1685. **The Knowledge of things unknown.**
12mo. Printed for W. Thackeray at the Angel in Duck Lane.
Symons's Catalogue.
1688. **The Knowledge of things unknown.**
8vo. Printed by J. M. for W. Thackeray at the Angel in Duck Lane.
British Museum Library.
1693. **The Knowledge of things unknown . . . with the Husbandman's practice.**
8vo. Printed by W. D. for W. Thackeray at the Angel in Duck Lane.
Hazlitt.
1697. *The Knowledge of Things Unknown : // Shewing the Effects of the PLANETS // and other Astronomical Constellations. // With the strange Events that befall Men, // Women, and Children, born under them. //*
Compiled by Godfridus, super palladium de Agricultura Anglicorum.
Together with * the Husbandman's Practice: or, // Prognostications for ever, as teacheth *Albert*, // *Alkind*, and *Ptolomy*. // With the Shepherd's Prognostication for the Wea- // ther, * and *Pythagoras* his Wheel of Fortune. //
- This is unknown to many Men,
Though it be known to some Men.*
Printed by W. W. for W. Thackeray.
No date, but from p. 136 it was [1697].

Collation 8vo, Black Letter, pp. 1-76, then a second title as between the two * above, but adding "By *Melampus*, a Greek author," and at foot, "Printed by W. WILDE for H. RHODES in Fleet-street." This forms p. 77, and the book goes on to 172, after which follow 10 pp., unnumbered, giving dates of Fairs.

Symons's Library.

- 1707.** *The Knowledge of Things Unknown.* Printed by H. RHODES at the *Star*, the corner of *Bride Lane*, in Fleet-street, 1707. Collation as above, but with a frontispiece of a man taking angular measurements of the stars (possibly missing from the 1697 copy).

Symons's Library.

- 1729.** THE KNOWLEDGE OF THINGS UNKNOWN, shewing the Effects of the Planets and other Astronomical Constellations, with the Strange Events that befall Men, Women, and Children, born under them, together with the Husbandman's Practice and the Shepherd's Prognostication for the Weather, and Pythagoras, his Wheel of Fortune, *curious cuts*, 12mo. Printed for the booksellers of London and Westminster.

University of London Library.

- 1743.** THE KNOWLEDGE OF THINGS UNKNOWN * * * * with the Husbandman's Practice.

London, Printed for J. Clarke, at the Golden Ball, in Duck Lane, and A. Wilde in Aldersgate Street.

British Museum Library.

- 1750.** THE BOOK OF KNOWLEDGE; Treating of the Wisdom of the Ancients. 8vo. London.

Hellmann's Library.

- 1800?** THE BOOK OF KNOWLEDGE. 12mo, Edinburgh.
This does not mention Godfridus, and contains only selections from the early editions.

British Museum Library.

- [1806 ?]** THE COMPLETE // BOOK OF KNOWLEDGE // (Treating of the Wisdom of the ANCIENTS): // shewing // the Effects of the PLANETS and other // Astronomical Constellations: * * * Likewise // a brief account of the natural causes of METEORS, // as Rain, Hail, Snow, Frost, Dew, &c. // * * *

London. Printed and sold by J. Hollis, No. 21, Shoemaker-row, Black-Friars. No date.

Collation—8 vo. Frontispiece (a man looking through a very primitive telescope on an altazimuth stand) pp. 1 to 68, then $\frac{1}{2}$ -title, "The Husbandman's Practice; or, Prognostications for Ever," which occupies pp. 69 to 96. (It is very much abridged from the earlier editions). p. 96 finishes with "THE END," and the imprint of the above-named, J. Hollis.

In the same volume, by the same printer, and apparently of about the same date, is

THE SHEPHERD'S KALENDAR; or THE CITIZEN'S AND COUNTRYMAN'S COMPANION, containing Infallible signs of the weather, to know when wet or dry, when sudden storms arise, or hot or cold weather, by living creatures Being about Forty Years study and experience of a learned Shepherd. 12th Edition, with Additions.

8vo. London, J. Hollis, 21, Shoemaker's Row, Black-Friars.

Collation.—Frontispiece (a shepherd under a tree), pp. i. vi., 7-94. Pages 1-42 are almost wholly filled with weather proverbs, but are mostly different from those in the "Book of Knowledge," and they differ entirely from those in Claridge's "Shepherd of Banbury's Rules to judge of the Changes of the Weather."

Roy. Meteor. Soc. Library.

Three Essays on Australian Weather. HON. RALPH ABERCROMBY.

F. W. White, Sydney, 1896. 8vo, iv.—101 pages, 4 plates.

ALTHOUGH not one of these three essays was written by Mr. Abercromby, his head and his purse have been largely instrumental in the production of the present handy volume.

The first is a reprint of Mr. H. C. Russell's paper on "Moving Anticyclones," read before the Roy. Meteor. Soc., and published in the *Quar. Jour.* in 1893.

The second is Mr. Hunt's "Essay on Southerly Bursters," which obtained the £25 prize offered by Mr. Abercromby, and which was mentioned on page 47 of our last volume.

The third essay is new; it has been prepared by Mr. Hunt at Mr. Abercromby's expense, and has been edited by Mr. H. C. Russell, the title being, "Types of Australian Weather." It may be briefly described as "40 weather maps of Australia, with commentaries thereupon." We have very little doubt that eventually that which we believe was at one time done in New Zealand will be done generally, viz., that instead of central offices telegraphing the actual readings at individual stations, they will send a code number

corresponding to the type of pressure-system prevailing over their area. This series would form a good basis whereupon to develop such a system. The maps would have gained in clearness had the isobar for 30 inches always been made twice the thickness of any other. As it is, there are a few instances in which it is not easy to be sure what values some isobars represent—*e.g.*, the S.E. of No. 17 and the S.W. of No. 25.

There is one point upon which the author is silent, probably because he was writing as an Australian for Australians, and they doubtless realize the vastness of their country, and the immense areas whence they have no records, but for general readers it would have been well to give one map showing the stations whence alone data were available. If, as we presume, the arrows represent the stations, there seems to be an area (W. of Sir Charles Todd's line of telegraph stations) about twice the size of the British Isles, whence no returns are received; this gives a grand opportunity for drawing symmetrical isobars—and we see that they are drawn with equal confidence over the sea between Australia and New Zealand, a stretch of about 1,000 miles—say equal to the distance from Cornwall to Gibraltar; this again is a lovely field for the development of the imagination. We neither think nor suggest that Mr. Hunt's curves are improbable, but we should have had more confidence in them had the curves been solid where ample data existed, and dotted where they represent merely probabilities.

ERRATA IN "METEOROLOGICAL MAGAZINE," 1895.

REGULAR TABLES.

Camden Square	Jan.	Min. temp. 20°·2 on 30th <i>should be</i> 17°·2 on 29th.
Cardiff, Ely	„	Total rain <i>should be</i> 4·84 in., <i>not</i> 4·74 in.
„ „	June	„ „ „ „ 1·24 „ „ 1·63 „
Glencarron Lodge	Oct.	„ „ „ „ 11·16 „ „ 11·20 „
Darrynane Abbey	Sep.	„ „ „ „ ·99 „ „ ·88 „

SUPPLEMENTARY TABLES.

Dorking, Abinger Hall..	Jan.	Total rain <i>should be</i> 2·51 in., <i>not</i> 2·45 in.
Longford, Curryrane ..	Feb.	„ „ „ „ ·36 „ „ 2·07 „
Lynmouth, Glenthorne.	Mar.	„ „ „ „ 3·94 „ „ 4·07 „
Clifton, Pembroke Road	„	„ „ „ „ 2·41 „ „ 2·27 „
Killarney, Woodlawn...	Oct.	„ „ „ „ 4·63 „ „ 4·00 „

CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE, FEBRUARY, 1896.

STATIONS. (Those in italics are South of the Equator.)	Absolute.				Average.				Absolute.		Total Rain.		Aver.
	Maximum.		Minimum.		Max.	Min.	Dew Point.	Humidity.	Max. in Sun.	Min. on Grass.	Depth.	Days.	
	Temp.	Date.	Temp.	Date.									
	°		°		°		°	0-100	°	°	inches		
England, London	56·4	28	23·2	26	46·2	34·7	36·6	88	86·9	19·8	·30	8	7·0
Malta	63·8	15a	40·1	18	60·2	51·3	46·8	84	119·1	33·2	1·91	9	6·3
<i>Mauritius</i>	85·6	8	69·6	25	82·3	73·8	70·8	81	135·8	62·4	30·06	22	7·1
Calcutta	98·5	27	52·4	21	86·3	61·6	51·3	54	149·7	44·0	·02	1	1·3
Bombay	85·5	29	65·4	21	82·4	69·0	65·5	70	133·5	52·4	·00	0	1·2
Ceylon, Colombo	93·4	27	67·5	2	89·8	72·4	68·5	71	160·5	60·0	·35	2	3·3
<i>Melbourne</i>	102·8	17	49·2	2	75·0	58·6	56·0	71	149·9	40·0	3·08	8	6·3
<i>Adelaide</i>	110·9	17	53·4	1, 3	86·2	63·7	52·3	45	160·8	42·7	·32	5	3·8
<i>Sydney</i>	98·0	1	58·7	4	76·9	66·8	65·0	77	156·4	51·3	4·74	18	6·9
<i>Wellington</i>	79·0	22	45·0	12b	69·6	54·9	50·1	65	139·0	36·0	3·34	6	3·7
<i>Auckland</i>	84·0	8	48·5	25	75·1	58·3	54·4	65	146·0	45·0	·34	6	4·0
Jamaica, Kingston.....	91·1	12	65·8	1	85·6	69·4	66·4	76	...	...	2·40	5	3·2
Trinidad	89·0	5dys	63·0	26	86·9	66·7	67·5	77	167·0	61·0	·88	7	...
Grenada.....	85·0	24	69·0	11	81·7	71·4	66·2	70	151·2	...	3·45	15	2·0
Toronto	44·9	28	—17·2	17	29·7	14·6	20·6	83	73·0	—23·5	3·95	...	6·8
New Brunswick, Fredericton	44·4	24	—20·0	18	25·8	7·3	13·3	76	...	...	4·78	14	5·8
Manitoba, Winnipeg }	45·8	26	—42·4	15	18·5	—7·5	...	...	...	...	·42	5	3·9
British Columbia, Esquimalt..... }	55·1	18	26·2	29	50·4	37·4	38·7	89	...	...	6·80	21	7·8

a—and 27. b—and 24.

REMARKS.

MALTA.—Adopted mean temp. $54^{\circ}\cdot 1$, or $0^{\circ}\cdot 2$ above the average. Mean hourly velocity of wind 9·5 miles. Thunderstorm on 24th; hail on 16th and 17th. Dew-point temp. ranged between $35^{\circ}\cdot 3$ on 17th and $56^{\circ}\cdot 9$ on 24th. J. F. DOBSON.

Mauritius.—Mean temp. of air $0^{\circ}\cdot 7$ below, of dew point $0^{\circ}\cdot 8$ above, and rainfall 22·91 in. above, their respective averages. Mean hourly velocity of wind 13·0 miles. or 1·7 mile above average; extremes, $51^{\circ}\cdot 3$ on 19th, and $1^{\circ}\cdot 8$ on 3rd; prevailing direction, E.S.E. Lightning on 2nd and 3rd, and thunder on 7th. This month has been the wettest on record all over the Island, and especially on the uplands, from 40 to 55 inches falling at several stations; from 9 a.m. on 19th to 10.25 a.m. on 20th 17·34 in. of rain fell at the Observatory. C. MELDRUM, F.R.S.

Adelaide.—Mean temp. $1^{\circ}\cdot 3$ above the average of 39 years; rainfall 28 in. below the average. The absolute max. in shade is the highest ever recorded here in February. C. TODD, F.R.S.

Sydney.—Mean temp. $1^{\circ}\cdot 0$ above, humidity 2·9 above, and rainfall 76 in. below, their respective averages. H. C. RUSSELL, F.R.S.

Wellington.—Very heavy rain (2·10 in.) on 2nd, with a strong N.W. gale, then generally fine up to the 22nd; remainder of the month showery, especially on 23rd, when 1·00 in. of rain fell. Strong N.W. winds during the latter part, otherwise a fine, bright, warm month. Mean temp. $0^{\circ}\cdot 2$ below, and rainfall 20 in. below the average. R. B. GORE.

Auckland.—An exceedingly dry and fine month, the rainfall being less than one-tenth of the average. Barometrical pressure and mean temp. both above the average. T. F. CHEESEMAN.

JAMAICA, KINGSTON.—In Kingston, weather fair; mean hourly velocity of wind 4·6 miles; rainfall about four times the average. In the Island generally, however, the fall was twice the average. R. JOHNSTONE.

TRINIDAD.—Rainfall 81 in. below the average of 30 years. J. H. HART.

SUPPLEMENTARY TABLE OF RAINFALL,
 JULY, 1896.

[For the Counties, Latitudes, and Longitudes of most of these Stations,
 see *Met. Mag.*, Vol. XIV., pp. 10 & 11.]

Div.	STATION.	Total Rain. in.	Div.	STATION.	Total Rain. in.
II.	Dorking, Abinger Hall ..	1·39	XI.	Lake Vyrnwy	2·35
„	Birchington, Thor	1·39	„	Corwen, Rhug	1·60
„	Hailsham	1·65	„	Llanystunndwy, Talarvor ..	3·45
„	Ryde, Thornbrough	1·03	„	I. of Man, Douglas	5·93
„	Emsworth, Redlands ...	1·15	XII.	Stoneykirk, Ardwell Ho.	6·51
„	Alton, Ashdell	·92	„	New Galloway, Glenlee ..	7·01
III.	Oxford, Magdalen Col.	1·39	„	Lilliesleaf, Riddell	3·68
„	Banbury, Bloxham	1·21	XIII.	N. Esk Res. [Penicuik] ..	4·05
„	Northampton, Sedgebrook	1·23	„	Edinburgh, Blacket Pl.	4·33
„	Alconbury	1·08	XIV.	Glasgow, Queen's Park..	3·92
„	Wisbech, Bank House...	1·58	XV.	Inverary, Newtown	4·05
IV.	Southend	1·12	„	Oban, The Corran	...
„	Harlow, Sheering	·83	„	Islay, Gruinart Schools..	3·91
„	Colchester, Lexden	·57	XVI.	Dollar	4·20
„	Rendlesham Hall	·35	„	Balquhider, Stronvar...	4·62
„	Rushall Vicarage	1·00	„	Ballinluig	2·79
„	Swaffham	2·07	„	Dalnaspidal H.R.S.	3·96
V.	Salisbury, Alderbury ...	·69	XVII.	Keith H.R.S.	3·03
„	Bishop's Cannings	1·71	„	Forres H.R.S.	3·06
„	Blandford, Whatcombe ..	·86	XVIII.	Fearn, Lower Pitkerrie..	3·58
„	Ashburton, Holne Vic...	2·29	„	N. Uist, Loch Maddy ...	4·61
„	Okehampton, Oaklands.	1·81	„	Invergarry	2·24
„	Hartland Abbey	1·61	„	Aviemore H.R.S.	3·09
„	Lynmouth, Glenthorne.	1·11	„	Loch Ness, Drumnadrochit	2·09
„	Probus, Lamellyn	2·13	XIX.	Invershin	2·06
„	Wellington, The Avenue	1·33	„	Scourie	3·15
„	Wincanton, Stowell Rec.	1·21	„	Watten H.R.S.	3·34
VI.	Clifton, Pembroke Road ..	·97	XX.	Dunmanway, Coolkelur ..	6·83
„	Ross, The Graig	1·08	„	Cork, Wellesley Terrace ..	5·16
„	Wem, Clive Vicarage ...	2·34	„	Killarney, Woodlawn ...	6·05
„	Cheadle, The Heath Ho.	1·04	„	Caher, Duneske	4·89
„	Worcester, Diglis Lock ..	1·81	„	Ballingarry, Hazelfort...	5·19
„	Coventry, Coundon	2·09	„	Limerick, Kilcornan ...	4·00
VII.	Ketton Hall [Stamford]	1·46	„	Broadford, Hurdlestown ..	...
„	Grantham, Stainby	1·86	„	Miltown Malbay	5·55
„	Horncastle, Bucknall ...	1·75	XXI.	Gorey, Courtown House ..	5·07
„	Worksop, Hodsck Priory ..	1·53	„	Athlone, Twyford	7·48
VIII.	Neston, Hinderton	1·98	„	Mullingar, Belvedere ...	6·94
„	Southport, Hesketh Park ..	3·98	„	Longford, Currygrane...	7·41
„	Broughton-in-Furness ...	5·66	XXII.	Woodlawn	7·24
IX.	Ripon, Mickley	1·84	„	Crossmolina, Enniscoe ..	4·52
„	Melmerby, Baldersby ...	2·17	„	Collooney, Markree Obs.	4·69
„	Scarborough, Obs.	2·02	„	Ballinamore, Lawderdale ..	...
„	Middleton, Mickleton	2·49	XXIII.	Lough Sheelin, Arley...	7·67
X.	Haltwhistle, Unthank...	3·08	„	Warrenpoint	7·72
„	Bamburgh	2·60	„	Seaforde	6·78
„	Keswick, The Bank	4·16	„	Belfast, Springfield	7·74
XI.	Llanfrehfa Grange	1·66	„	Bushmills, Dundarave..	5·64
„	Llandovery	1·97	„	Stewartstown	7·26
„	Castle Malgwyn	4·33	„	Killybegs	4·60
„	Builth, Abergwesyn Vic.	3·29	„	Lough Swilly, Carrablagh	4·01
„	Rhayader, Nantgwillt ...	2·64			

JULY, 1896.

Div.	STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL.					Days on which -01 or more fell.	TEMPERATURE.				No. of Nights below 32°.	
		Total Fall.	Differ- ence from average 1880-9.	Greatest Fall in 24 hours		Max.		Min.					
				Dpth	Date				Deg.	Date	Deg.	Date.	
I.	London (Camden Square) ...	1·03	— 1·65	·49	26	7	88·7	14	47·7	2, 29	0	0	
II.	Maidstone (Hunton Court)...	·73	— 1·45	·40	26	3	...	...	...	...	...	...	
III.	Strathfieldsaye	·60	...	·25	26	7	...	...	...	...	...	...	
IV.	Hitchin	1·01	— 1·71	·56	26	9	85·0	13	44·0	10 ^f	0	...	
V.	Winslow (Addington)	1·02	— 2·27	·45	26	12	37·0	21	40·0	29	0	0	
VI.	Bury St. Edmunds (Westley)	2·07	— ·50	·44	29	11	78·0	14 ^b	47·0	18	0	...	
VII.	Norwich (Brundall)	1·00	...	·23	15	8	85·0	21	41·4	3	0	0	
VIII.	Weymouth (Langton Herring)	·72	— 1·43	·22	24	10	75·0	10 ^c	50·0	29	0	...	
IX.	Torquay (Cary Green) ...	1·52	...	·84	24	10	75·4	7	50·0	28 ^g	0	0	
X.	Polapit Tamar [Launceston]..	1·55	— 1·86	·63	24	13	80·7	20	39·4	28	0	0	
XI.	Stroud (Upfield)	·68	— 2·89	·17	1	12	83·0	20	49·0	28	0	...	
XII.	Church Stretton (Woolstaston)	2·28	— ·69	·65	9	12	81·5	20	45·0	17	0	...	
XIII.	Tenbury (Orleton)	1·77	— 1·09	·52	31	12	85·3	13	38·9	28	0	0	
XIV.	Leicester (Barkby)	3·55	+ ·56	2·78	7	14	85·0	20 ^d	38·0	27	0	0	
XV.	Boston	·73	— 2·06	·22	7	7	92·0	13	45·0	28	0	...	
XVI.	Hesley Hall [Tickhill]	1·61	— 1·06	1·02	26	11	86·0	20	42·0	28	0	...	
XVII.	Manchester (Plymouth Grove)	1·90	— 1·89	·50	24	13	85·0	13	41·0	27	0	...	
XVIII.	Wetherby (Ribston Hall) ..	1·90	— 1·28	·42	22	8	...	...	...	...	...	...	
XIX.	Skipton (Arncliffe)	3·97	— 1·67	1·05	24	10	...	...	...	...	...	...	
XX.	Hull (Pearson Park)	1·18	— 1·41	·57	26	10	85·0	20	43·0	29	0	...	
XXI.	Newcastle (Town Moor)	2·70	— ·82	·95	24	12	...	...	...	...	...	...	
XXII.	Borrowdale (Seathwaite)	8·97	— 2·02	1·53	8	18	...	...	...	...	...	...	
XXIII.	Cardiff (Ely)	1·64	— 2·42	·45	24	11	...	...	...	...	...	...	
XXIV.	Haverfordwest	4·60	+ ·39	1·32	24	15	76·8	20	40·6	28	0	0	
XXV.	Aberystwith (Gogerddan) ...	2·88	...	·55	9	13	76·0	31	36·0	16	0	...	
XXVI.	Llandudno	2·97	— ·03	·92	9	14	73·0	20	48·5	8	0	...	
XXVII.	Cargen [Dumfries]	5·27	+ 1·34	1·13	23	12	74·2	13	39·0	28	0	0	
XXVIII.	Jedburgh (Sunnyside)	3·17	— ·27	·55	8	12	77·0	13	38·0	28	0	...	
XXIX.	Colmonell	7·09	...	1·67	8	20	79·0	12	40·0	9, 27	0	...	
XXX.	Lochgilphhead (Kilmory)	4·21	— ·09	·48	19	23	...	...	38·0	27	0	...	
XXXI.	Mull (Quinish)	4·43	+ ·38	·76	25	24	...	...	...	...	...	...	
XXXII.	Loch Leven Sluices	4·30	+ ·68	1·30	26	10	...	...	...	...	...	...	
XXXIII.	Dundee (Eastern Necropolis)	3·75	+ ·29	1·35	25	15	76·8	18	42·2	28	0	...	
XXXIV.	Braemar	3·23	+ ·02	1·06	25	15	74·4	18	35·0	24	0	3	
XXXV.	Aberdeen (Cranford) ...	3·54	...	1·32	25	18	78·0	19 ^e	42·0	2, 27	0	...	
XXXVI.	Strathconan [Beaully]	2·55	— ·95	1·25	27	10	...	...	...	...	...	...	
XXXVII.	Glencarron Lodge	4·02	...	·90	25	20	69·0	13	39·6	28	0	...	
XXXVIII.	Cawdor	3·74	+ ·44	·84	25	21	...	...	...	...	...	...	
XXXIX.	Dunrobin	3·31	+ ·46	1·39	24	15	70·0	19	44·0	25 ^h	0	...	
XL.	S. Ronaldsay (Roeberry)	3·11	+ ·75	1·20	25	14	67·0	11	45·0	1	0	...	
XLI.	Darrynane Abbey	5·82	...	1·57	23	20	...	...	...	...	...	...	
XLII.	Waterford (Brook Lodge) ...	7·06	+ 3·53	2·00	9	14	74·0	18	43·0	27	0	...	
XLIII.	O'Briensbridge (Ross)	5·50	...	2·23	24	16	...	...	...	...	...	...	
XLIV.	Carlow (Browne's Hill)	4·76	+ 1·24	1·67	8	16	...	...	...	...	...	...	
XLV.	Dublin (Fitz William Square)	5·47	+ 2·79	2·02	24	18	76·7	13	45·0	28	0	0	
XLVI.	Ballinasloe	7·62	+ 4·07	2·50	24	19	72·0	20	40·0	10	0	...	
XLVII.	Clifden (Kylemore)	8·36	...	2·31	8	20	...	...	...	...	...	...	
XLVIII.	Waringstown	8·10	+ 4·58	1·82	8	20	79·0	11	45·0	4 ⁱ	0	0	
XLIX.	Londonderry (Creggan Res.) ..	5·44	+ 1·32	1·31	25	25	...	...	...	...	...	...	
L.	Omagh (Edenfel)	4·63	+ ·91	·90	8	20	70·0	13	37·0	27	0	...	

+Shows that the fall was above the average; —that it was below it.

a—and 14, 20. *b*—and 22. *c*—and 14. *d*—and 21. *e*—and 20. *f*—and 31. *g*—and 29.
h—and 28. *i*—and five other dates.

METEOROLOGICAL NOTES ON JULY, 1896.

ABBREVIATIONS.—Bar. for Barometer; Ther. for Thermometer; Max. for Maximum; Min. for Minimum; T for Thunder; L for Lightning; TS for Thunderstorm; R for Rain; H for Hail; S for Snow.

ENGLAND.

HITCHIN.—This month completes the driest period of seven months from January to July in our record, except 1870.

ADDINGTON.—A hot, dry month, what little rain fell being quickly dried up by the hot ground. On the evening of the 7th, at 6 o'clock, a heavy TS with constant and vivid L but little R occurred to the N. of us. At the end of the month R was much needed, the pastures being dried up and brown. Harvest operations general in the last week of the month.

BURY ST. EDMUNDS, WESTLEY.—A very hot month, with much sunshine, and the storms, as in June, were very partial. The scorching sunshine damaged the barley on light lands. Distant T on 7th, TS on 15th, and T on 26th.

NORWICH, BRUNDALL.—The warmest July since 1887, and the warmest month since August, 1893, the mean temp. being $62^{\circ}\cdot8$. Rainfall 1'89 in. below the average, the deficiency of the year being 3'73 in. The surface of the soil was much scorched and parched by the sunshine and want of rain. The 21st was the warmest day since August 18th, 1893. T and L on 7th; distant TS on 8th.

WEYMOUTH, LANGTON HERRING.—Since the beginning of the year the rainfall has been only 7'63 in., the lowest for the first seven months of the year in 22 years, and only 52 per cent. of the average. Root crops in this neighbourhood are a total failure. The mean 9 a.m. temp., $63^{\circ}\cdot8$, is exactly 1° above the average, and this is the ninth consecutive month with temperature above the average. Fog on the 6th; T and L on the 7th and 14th.

TORQUAY, CARY GREEN.—Rainfall 1'27 in. below the average; the fall of seven months, January to July, being 9'83 in. below the average. Mean temp. $62^{\circ}\cdot8$, or $1^{\circ}\cdot6$ above the average. Duration of sunshine 242 hours 40 mins., being 58 hours 20 mins. above the average; one sunless day.

POLAPIT TAMAR [LAUNCESTON].—Another very dry, hot month, the average max. shade temp. being $69^{\circ}\cdot5$. Fogs early on 5th, 6th, 7th, 12th, 16th, 17th and 19th.

WOOLSTASTON.—Another hot month, and till the 21st very dry, though there was a heavy fall on the 9th. The want of water is severely felt, the brooks being nearly dried up. Harvest began very early, and the grain crops generally are good. Mean temp. $60^{\circ}\cdot9$.

TENBURY, ORLETON.—Another very fine, warm month, with a mean temp. more than $2^{\circ}\cdot5$ above the average. There was a large proportion of hot sun during the first half of the month, but more unsettled weather prevailed towards the end. T on 7th, 17th and 26th.

LEICESTER, BARKBY.—A heavy TS occurred on the 7th, the like of which has not been experienced for many years, 2'78 in. of R falling. This fall did not reach to the Leicester Reservoirs, a few miles hence, so that the water famine continues there in increasing intensity. Mean temp. $61^{\circ}\cdot8$.

MANCHESTER, PLYMOUTH GROVE.—Very fine summer weather prevailed on the 12th and 13th, also on 19th and 20th; but on the whole the weather was dull, cold and unsettled. Mean temp. $57^{\circ}\cdot5$, the lowest for July since observations commenced in 1868. T and L on the 9th.

WALES.

HAVERFORDWEST.—The temp. fell somewhat during the first few days, and small quantities of R fell up to the 9th; very fine harvest weather then prevailed with bright sunshine up to the 15th, when the temp. fell and the wind blew a

moderate gale; fresh breezes prevailed for a couple of days, followed by fine warm weather again up to the 21st, when a rather sudden fall of temp. took place, with showers. E commenced falling at 5 p.m. on the 23rd, and in about 36 hours 2·80 in. fell, a most acceptable fall, as the country seemed on the verge of ruin. The weather was then fine to the end of the month. No excessive heat prevailed, but the temp. rose above 70° on 14 days. There was a sharp TS at 4 p.m. on the afternoon of the 31st. Prevailing winds N.E. and N.W.

SCOTLAND.

CARGEN [DUMFRIES].—Absence of sunshine (53 hours below the average of the month) and excessive rainfall were the features of the month. Out of a total rainfall of 5·27 in., 3·02 in. fell in the three days 23rd–25th, this heavy fall doing considerable damage to the heavier crops of corn. The mean bar. pressure and mean temp. of the month were about normal. Harvest, which commenced on several farms during the last few days of the month, will be one of the earliest on record in the district, and, generally speaking, crops are above the average. The turnip crop promises well; pastures continue excellent, and the hay crop was above an average. Potato disease made an unusually early appearance on some farms in the district.

JEDBURGH.—Vegetation made great progress during the month, and all crops look well. The harvest will be a fortnight earlier than usual. Potatoes a good crop, and quite free of disease.

COLMONELL.—Rainfall 3·63 in. above, or rather more than twice, the average of 20 years. Mean temp. 58°·9, or 0°·3 above the average.

ABERDEEN, CRANFORD.—There was little sunshine throughout the month, and a strong gale blew from the north on the 27th.

S. RONALDSAY, ROEBERRY.—A very fair month upon the whole, although wetter than the average of 29 years. Mean temp. 55°·0, 0°·5 above the average.

IRELAND.

DARRYNANE ABBEY.—A wet but warm month.

O'BRIENSBRIDGE, ROSS.—A very favourable month for all purposes, the rather heavy E having fallen in a limited number of days. The heavy fall of 24th (2·23 in.), owing to the dryness of the land and dykes, was quickly absorbed, and did little damage.

DUBLIN.—A generally favourable month, characterised, however, by occasional torrential rainfalls. Rainstorms of exceptional violence occurred on the 8th (1·56 in.) and 24th (2·02 in.) The fall of the 24th is the largest recorded since May 28th, 1892, when 2·06 in. fell. The mean temp., 60°·9, is slightly (0°·3) above average. High winds were noted on only 3 days, and attained the force of a gale only on the 4th. L on the 9th; TS on the afternoon of the 25th; solar halo on the 10th.

WAKINGSTOWN.—The wettest month recorded since 1861, when the record began; but in spite of this the crops of all kinds look magnificent, and we only want a moderately fine six weeks to secure a splendid harvest.

OMAGH, EDENFEL.—The frequent and heavy rains which prevailed with but little intermission throughout the month, although of much benefit to grass and green crops, damaged the cereals and imperilled the safety and quality of the hay.

REGISTER MAP INDICATING CONDITIONS OF THE ATMOSPHERE ON THE SAME DAY IN SEVERAL PARTS OF GREAT BRITAIN FROM OBSERVATIONS COLLECTED AT THE GREAT EXHIBITION for 9 am. 8th Aug^r, 1851.

